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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

MAILED
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GROUP 2800

Application Number: 10/801,944
Filing Date: March 15, 2004
Appellant(s): STROM ET AL.

Anthony G. Smyth
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 05/29/2007 appealing from the Office action mailed 02/26/2007

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in

the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters.

The brief is deficient because:

i) each independent claim involved in the appeal and each dependent claim are not argued separately;

ii) independent claims 1, 9, 18 do not require planarity measurements of free hanging probes **by optical means**, use of **an optical system** for planarity measurement **recited in dependent claims 6 and 15**;

iii) independent claims 1, 9 and 18, do not require **probes are electrically insulated in the free hanging state**. In fact no claims on appeal recites this limitation;

iv) independent claims 1, 9 and 18, do not recite **optical scan,** these claims also do not recite **assigned a planarity values to free-hanging probes**, but dependent claims 3 and 12 recites assigned a planarity values to free-hanging probes;

v) independent claims 1, 9 and 18, do not recite "Probe float may be calculated for each probe **by subtracting the optical (free-hanging) planarity value from the electrical planarity value**," instead independent Claims 1 and 9 recites **"calculating probe float <u>using results</u>** of said acquiring and said obtaining" and Claim 18 recites

"calculate probe float using said free-hanging planarity **measurement** and said first electrical contact planarity **measurement**."

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. Rejection under 35 U.S.C §101, for independent claims 1, 9 and 18.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,870,382	Harris	03-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims: minor correction are made to increase the clarification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-7, 9-13, 15-16 and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Harris (US 6,870,382).

With regard to claims 1 and 9, Harris teaches a method of calculating and measuring a probe float comprising: acquiring a free-hanging planarity measurement, obtaining a first electrical contact planarity measurement, and calculating probe float using results of the acquiring and obtaining [see Abstract, line 37 and lines 49-56 of column 6].

With regard to claims 2 and 10, Harris teaches the calculating comprising computing a difference between results of the obtaining and acquiring [see lines 32-37 of col. 6].

With regard to claims 3 and 12, Harris teaches acquiring a reference planarity measurement, providing relative translation between a contact surface and a probe card, identifying new free-hanging probes responsive to providing, assigning a planarity value to newly identified free-hanging probes, and selectively repeating the providing, identifying, and assigning [using a computer, also see lines 1-20 of col. 5 and lines 42-56 of column 6].

With regard to claims 4 and 13, Harris teaches selectively iterating the providing, identifying, and assigning until a planarity value has been assigned to every probe [see lines 42-46 of column 11 and fig. 2-3].

With regard to claims 6, 7, 15 and 16, Harris teaches acquiring a reference planarity and identifying new free-hanging probes measurement comprises utilizing the optical system [see lines 32-37 of column 6, particularly line 37].

With regard to claim 11, Harris teaches repeating the acquiring, obtaining, and calculating for each probe [see fig. 3].

With regard to claim 18, Harris teaches a computer readable medium with data and instructions that acquires a free-hanging measurement, obtains a first electrical contact planarity measurement, and calculates probe float using the free-hanging planarity measurement and the first electrical contact planarity measurement [see Abstract, lines 32-40 of col. 11 and lines line 37 and lines 49-56 of column 6].

With regard to claim 19, Harris teaches the instructions further comprising computing a difference between results of the obtaining and acquiring [lines 32-37 of column 6].

With regard to claim 20, Harris teaches the instruction further comprising repeating the acquiring, obtaining, and calculating for each probe [see fig. 3].

(10) Response to Argument

Appellants' arguments' commence on page 5, section VIII.

Examiner has given the broadest reasonable interpretation to the claimed invention i.e. probe float is calculated from a planarity of the z position difference of each probe tip between the free hanging state and an electrical contact state (also see fig. 2 of Appellant's disclosure and interview summary for the office dated 02/26/2007 where Examiner suggested a language i.e. calculating probe float by subtracting results of said acquiring from said obtaining to overcome Harris and for possible allowance). Appellants' at section V (Summary of claimed subject matter) of the Appeal Brief discloses "Probe float may be calculated for each probe by subtracting the optical (free-hanging) planarity value from the electrical planarity value. Page 7, lines 3-8." This limitation is not found in the claims.

(I) Under the title "Harris Does Not Teach Calculating Probe Float" for claims 1, 9 and 18, Appellants' argues,

> *Harris does not explicitly or impliedly teach or suggest all of the elements cited in independent claims 1, 9 and 18. The independent claims require calculating probe float using results of acquiring a free-hanging planarity measurement and of obtaining a first electrical contact planarity measurement. Harris is entirely silent regarding probe float calculation. In its sole reference to float, Harris references pin float for the purpose of dismissing optical solutions for planarity*

measurement as "not feasible in a production environment." Harris col. 5, lines 51-59. Furthermore, Harris explicitly limits itself to evaluating probe tip planarity based solely on measurements of the point of first electrical contact of probe tips. Harris, col. 4, lines 61-64; col. 5, lines 51-59 and col. 6, lines 10-11 and lines 28-48. Harris describes no formula or method for calculation of probe float. Therefore, the Examiner erred in rejecting the independent claims.

Examiner disagrees with Appellants' argument about Harris does not teach calculating probe float. Also, Harris is not silent regarding probe float calculation, because Harris discloses the z position difference of the probe tip between the free hanging state (probe tip close to a mechanical contact state) and an electrical contact state. Harris is not dismissing optical solutions as Appellants' argued because Harris uses optical method to determine z position when probe tip is close to a mechanical contact of a contact surface (see line 37 of column 6 of Harris). Therefore, Harris discloses probe float calculation using optical and electrical contact states. Other arguments related to optical solution are not relevant to invention of the Harris.

At lines 20-24 of column 6, Harris discloses,

"A first embodiment of the present invention provides a software application and a method for evaluating the planarity of an array of probe tips 48 and the parallelism of the probe tip array 48 relative to a die on a wafer 42 while in the test environment."

Here, Harris discloses a method for evaluating the planarity of an array of probe tips 48 of the probe card 32.

At lines 28-37 of column 6, Harris discloses,

"The method of evaluation for the first embodiment has the following procedure, which may be implemented with existing equipment (see FIG. 1). For purposes of discussion of the first embodiment, it will be assumed that the die is aligned with the probe tip array in the x-y plane. The wafer chuck 44 is moved in the z direction toward the probe card 32 (and hence toward the probe tip array 48) in incremental steps as the die gets close to mechanically contacting at least one probe tip 48 or after the first mechanical contact is made **(e.g., this could be determined using optical method).**"

Here, Harris discloses at least one probe tip 48 close to a mechanical contact (free-hanging state), z position could be determined using an optical method.

At lines 42-46 of column 6, Harris discloses,

"At each increment (or in alternative at only some of the increments), the probe needles 50 are tested to determine whether electrical contact is occurring between each probe tip 48 and the corresponding bond pad or bumped pad on the die being tested."

Here, Harris discloses the electrical contact of probe tip 48 with contact surface of pad.

At lines 47-56 of column 6, Harris discloses,

"Preferably each probe tip 48 is tested at each increment. In alternative, only some of the probe tips 48 may be tested at

only some of the increments, for example. For each probe tip 48 tested at a given increment, **data is recorded as to whether electrical contact occurred.** Then, the recorded data is sorted to create a sorted data group of the data points having the **shortest distance between each probe tip 48 and the die where electrical contact occurred relative to a reference position (e.g., z position of first mechanical contact, or lowest position for wafer chuck 44).**"

Here, Harris discloses a difference or shortest distance between mechanical contact and electrical contact of each probe tip 48. The difference between mechanical contact (free-hanging state) and electrical contact positions for each probe tip are recorded as shown in fig. 2.

Therefore, Harris discloses the probe float from the difference of mechanical and electrical contact positions of each probe tip 48 in z direction, and method for calculation of probe float.

(II) Under title "Harris Does not Teach Acquiring Free-Hanging Planarity Measurements" for claims 1, 9 and 18, Appellants' argues,

> *Harris does not explicitly or impliedly teach or suggest all of the elements cited in independent claims 1, 9 and 18. The teachings of Harris are limited to systems that involve mechanical or electrical contact. Harris explicitly limits itself to evaluating probe tip planarity based solely on measurements of the point of first electrical contact of probe tips. Harris, col. 4, lines 61-64; col. 5, lines 51-59 and col. 6, lines 10-11 and lines 28-48. As discussed in the present specification, planarity measurements of free hanging probes must be measured by optical means because probes are electrically insulated in the free hanging state. Page*

5, lines 8-12. At most, Harris suggests that optical systems can be used to "report the z positions where mechanical contact occurs for each probe pin" and is silent regarding planarity measurements for free-hanging probes. Harris, col. 5, lines 51-53. However, Harris states that the point of mechanical contact of probe pins is not a reliable indicator of planarity because "the point of electrical contact (z-location of probe card 32 where electrical continuity exists between a probe needle 50 and a selected surface) typically differs from the point of mechanical contact." Harris, col. 5, lines 32-38, lines 59-67 and col. 6, lines 1-11. Further, Harris deems optical solutions for planarity measurement to be "not feasible in a production environment". Harris col. 5, lines 51-59. Consequently, Harris does not teach free-hanging planarity measurements and Harris provides no implied teaching of acquiring a free-hanging planarity measurement because Harris expressly eschews optical measurements of first mechanical contact.

Therefore, Harris does not explicitly or impliedly teach acquiring free-hanging planarity measurements and the Examiner erred in rejecting the independent claims.

Examiner disagrees with Appellants' argument about Harris does not teach acquiring free-hanging planarity measurement. Also, Harris is not silent regarding planarity measurements for free hanging probes, because Harris uses optical method to determine planarity of the probe array (see section (I) above and line 37 of column 6). Appellants' argues that "planarity measurements of free hanging probe **must be** measured by **optical means** because probes are electrically insulated in the free hanging state." The argument is not true because **claims 1, 9 and 18 do not recite optical means** as argued. Therefore optical means as argues is not required for these claims. However as stated above, Harris uses an optical means for planarity measurement. Use of optical means (as argued) is found at dependent claims 6 and 15.

At line 37 of column 6, Harris discloses planarity measurement of each probe tip 48 during mechanical contact using an optical method. **Each probe pin/tip 48 is in free-hanging state at the time of mechanical contact.** Therefore, Harris discloses planarity measurements of free hanging probe. Since, Harris in first embodiment (from lines 20 of column 6) discloses use of optical and electrical method for evaluating the planarity of an array of probe, the drawback as argued by Appellants', are not relevant

to the invention of Harris.

(III) Under title "Harris Does not Teach Identifying New Free-Hanging Probes" for claims 3, 12 and 18, Appellants' argues,

> *Each of claims 3, 12 and 18 require, inter alia, identifying new free-hanging probes responsive to providing relative translation between a contact surface and a probe card. Harris does not teach these elements arranged in the manner described. Repetition of selected steps recited in claims 3, 12 and 18 can be expected to increase the number of free-hanging probes as the probes are translated away from a contact surface. Harris provides no equivalent teaching. In contrast, Harris teaches decreasing separation between probe card and wafer chuck, thereby iteratively reducing the number of free-hanging probes. Harris col. 6, lines 28-46. Thus, Harris does not include every element of claims 3, 12 and 18 and Harris does not identically show every element of the claimed invention arranged as they are in the claims. Therefore, the rejections of claims 3, 12 and 18 should be withdrawn.*

Examiner disagrees with Appellants' arguments about claim 18, because Claim 18 is an independent claim and does not require argued steps.

Examiner again disagrees with Appellants' argument about "Harris does not teach identifying new free-hanging probes". An appellant states that identifying new free-hanging probes is responsive to providing relative translation between a contact surface and a probe card. Since, Harris discloses relative translation between the contact surface (i.e. movement of contact surface of die or wafer chuck) and a probe card 32, the new free-hanging probes (probes that are not yet in mechanical contact) are identified using the computer of Harris. Also, Harris discloses providing, identifying and assigning steps using a computer because invention of Harris moves the chuck 44 in a z direction in **an incremental steps, stores** and **plots the data** (see fig. 2-3 of

Harris) of the difference of z position **for each probe** when close to mechanical contact as a reference position (using optical method, see lines 37 and line 54-55 of column 6) and electrical contact position. Harris also repeats the steps for each probe in order to determine the difference of z position i.e. shortest distance. Therefore, Harris discloses all the elements arranged in a manner as claimed. Argument about repetition of selected steps can be expected to **increase the number of free-hanging probes** is not found in the claims.

(IV) Under title "Harris Does Not Teach The Use of Optical Systems For Planarity Measurements" for claims 6, 7, 15 and 16, Appellants' argues,

> *Each of claims 6, 7, 15 and 16 requires the use of an optical system for either acquiring a reference planarity measurement or identifying new free-hanging probes. Harris does not teach the use of an optical system, the acquiring of a reference planarity measurement or the identifying new free-hanging probes. Harris expressly disavows the use of optical solutions for planarity measurement, stating that optical solutions are "not feasible in a production environment". Harris col. 5, lines 51-59. Additionally, and as shown above regarding claims 3, 12 and 18, Harris teaches a system that progressively reduces free-hanging probes that does not create new free-hanging probes that can be identified using an optical system. Furthermore, Harris is entirely silent on using an optical system to acquire a reference planarity measurement. Therefore, the Examiner erred in rejecting claims 6, 7, 15 and 16.*

Examiner disagree with Appellants argument about Harris does not teach the use of optical systems for planarity measurements or the identifying new free-hanging probes, because as stated in section (I) above, and at lines 20-56 of column 6, particularly at line 37, Harris discloses use of optical method to determine z position (a reference position for reference planarity measurement, see lines 54-55 of column 6) for

evaluating the planarity of an array of probe tips 48. Harris also discloses computer to store and plot the data for each probe, therefore Harris discloses identifying a new free-hanging probe (probes that are not yet in mechanical contact) as claimed.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Paresh Patel

08/20/07

Conferees:

Ha Nguyen

8/20/7

David Blum